

REVIEW OF THE PELAGIC WET FISHERIES FOR 1978 AND 1979

Total commercial landings of pelagic wet fisheries declined in 1978 as a result of a virtual collapse of the anchovy reduction fishery. Jack mackerel landings also declined in 1978 from the 25-year high of the previous year, while Pacific mackerel, market squid, and Pacific herring fisheries recorded sizeable increases in landings (Table 1).

During 1979, the anchovy fishery made a moderate recovery, but jack mackerel landings continued to decline. The Pacific mackerel and market squid landings represented 22 and 33 year highs, respectively.

Pacific Sardine

The moratorium on sardines remained in effect during 1978, and their occurrence in mackerel landings was virtually nonexistent. Biomass levels continued to remain "very low" during the past few years when Pacific and jack mackerel had some apparently successful spawning seasons (1974 and 1976). Although live-bait fishermen in southern California seldom recorded the occurrence of adult sardines caught incidentally with anchovies, juvenile sardines, "firecrackers," were frequently encountered by several fishermen.

Although biomass levels remained low during 1979 and the moratorium remained in effect, some encouragement for the resource was gained from monitoring the species composition of mackerel landings. Whereas sardines rarely occurred in these landings in most recent years, during 1979 they were observed and sampled in all months from January through August. Although the majority of these occurrences were of trace quantities, it is estimated that 17 tons were landed. Also encouraging was the presence during April and May of a size class (160-200 mm), presumably 2-year olds, which has been

rarely observed in the last decade.

Although live-bait fishermen, in general, did not indicate any apparent increase in availability or occurrence of sardines, one fisherman, fishing off Palos Verdes Peninsula, indicated that 6-10-inch sardines made a "good show" on five successive nights in September, an event he considered rare.

Northern Anchovy

The total landings for 1978 reached 11,136 tons, the lowest in 14 years (Table 1).

The first half of the year saw very little fishing activity in either the northern or the southern areas. The lucrative herring and squid fisheries lured the entire Monterey fleet of nine boats from fishing anchovies, while southern area fishermen (47 permittees) encountered adverse weather and unavailability of commercial size fish schools, in addition to price disputes and labor union problems.

The 1978-79 reduction season was the first to be managed under the Pacific Fishery Management Council whose management plan was approved by the Secretary of Commerce on July 13, 1978. The regulations that implemented the plan define the procedures by which the United States reduction and nonreduction fisheries may harvest the anchovy resource. The regulations establish a total harvest quota for the anchovy fishery as well as a specific quota for the California reduction fishery. These quotas will be announced by Federal Register notice on or about August 1 of each year. The reduction fishery quotas for the 1978-79 season were 5,833 tons for the north and 52,500 tons for the south.

The season opened in the north on August 1, when interest in squid fishing was high. Boats did not catch any

TABLE 1

Landings of Pelagic Wet Fishes in California in Short Tons in 1964-79.

Year	Pacific sardine	Northern anchovy	Pacific mackerel	Jack mackerel	Pacific herring	Market squid	Total
1964	6,569	2,488	13,414	44,846	175	8,217	75,709
1965	962	2,866	3,525	33,333	258	9,310	50,254
1966	439	31,140	2,315	20,431	121	9,512	63,958
1967	74	34,805	583	19,090	136	9,801	64,489
1968	62	15,538	1,567	27,834	179	12,466	57,646
1969	53	67,639	1,179	26,961	85	10,390	105,307
1970	221	96,243	311	23,873	158	12,295	133,101
1971	149	44,853	78	29,941	120	15,756	90,947
1972	186	69,101	54	25,559	63	10,303	104,993
1973	76	132,636	28	10,308	1,410	6,031	150,489
1974	7	82,691	67	12,729	2,630	14,452	112,576
1975	3	158,510	144	18,390	1,217	11,811	190,075
1976	27	124,919	328	22,278	2,410	10,153	160,115
*1977	4	111,476	5,930	49,526	4,851	14,121	185,908
*1978	1	11,136	12,364	33,977	5,774	18,813	82,065
*1979	17	52,768	29,392	17,652	4,651	18,954	123,434

*preliminary

TABLE 2

Anchovy Landings for Reduction in the Southern and Northern Permit Areas for 1965-67 through 1978-79 Season, in Short Tons.

Season	Southern permit area	Northern permit area	Total
1966-67	29,589	8,021	37,610
1967-68	852	5,651	6,503
1968-69	25,314	2,736	28,050
1969-70	81,453	2,020	83,473
1970-71	80,095	657	80,752
1971-72	52,052	1,314	53,426
1972-73	73,167	2,352	75,519
1973-74	109,207	11,380	120,587
1974-75	109,918	6,669	116,587
1975-76	135,619	5,291	140,906
1976-77	101,434	5,007	106,441
1977-78	68,476	7,212	75,688
*1978-79	52,694	1,174	53,867

*preliminary

anchovies until late August, but the fish were very small and contained phytoplankton which created processing problems at the reduction plants. The abundance of squid and the absence of large fish eliminated any anchovy effort for the remainder of the year.

The 1978-79 season commenced in the south on September 15, but fishing effort was low and total landings through December 31 reached only 9,740 tons. Four Port Hueneme seiners caught over 50% of this total. Nine San Pedro-based seiners were actively fishing during the same period, landing fish at Terminal Island. The sharp decrease in fall 1978 anchovy landings might be attributed to the scarcity of legal-size fish (over 5 inches, total length) and a price dispute with the major cannery. Data analysis from this area indicated the presence of unusually high numbers of young fish (1978 year class) and the relative scarcity of older fish.

During 1978, an estimated 1,000 tons of anchovies were landed for nonreduction purposes, in addition to an estimated 6,600 tons for live-bait purposes.

As 1979 began, fishermen were still unable to locate good concentrations of anchovies, and on February 1, the reduction fisheries were closed for two months. However, fishing in the southern area began promptly on April 1, and on June 8 the fishery was closed when seasonal landings reached 52,694 tons (Table 2). In the north, landings remained minimal during the spring, as excellent squid fishing reduced effort towards anchovies.

The age composition of the 1979 spring fishery was marked by a strong appearance of one-year-old fish (1978 year class), which accounted for approximately 70% of sampled fish. The drastic decline in numbers of 3-year-old fish (1976 year class) was discomfiting, since it was this year class that appeared to be relatively strong during the fall and winter of 1977.

On the basis of egg and larvae surveys by the National Marine Fisheries Service, the quotas for the 1979-80 season were set at 10,000 tons for the northern area and 146,100 tons for the southern area. For the first three and a half months of the season, northern area fishermen concentrated on squid, but by the end of December four seiners had landed 1,396 tons. In the southern area, catches occurred exclusively in the Santa Barbara Channel, with 5,813 tons landed by the end of the year. Of this total, 5,218 tons were landed at Port Hueneme by four seiners, whereas one San Pedro boat accounted for 600 tons landed at Terminal Island.

Age data based on Port Hueneme samples indicate the 1978 year class was dominant, representing 80% of the sampled fish. The 1977 year class accounted for 17%, whereas the 1976 year class contributed a meager 3%.

An estimated 1,000 tons of anchovies were landed for nonreduction purposes in 1979. Live-bait landings totaled an estimated 6,000 tons.

Pacific Mackerel

The year 1978 began with the California Department of Fish and Game establishing a 5,000-ton quota for the 1977-78 season, retroactive to October 1, 1977. As of January 1, 1978, approximately 1,000 tons of the quota had been landed. The remaining 4,000 tons were fished under permit restrictions of 15-ton daily limits when Pacific mackerel occurred in catches in percentages greater than 60% by weight. On February 22, when the season landings were approaching 4,000 tons, restrictions were tightened by allowing fishermen to land only catches containing less than 40% by weight. On March 10, the season was closed when the 5,000-ton quota was reached, and subsequent landings could only contain 18% Pacific mackerel by weight.

During the ensuing month, urgency legislation was introduced with the intent of increasing the 1977-78 season quota and allowing the Department more flexibility in establishing permit restrictions. This legislation became effective July 5 and established the quota formula at 20% of the total biomass over 20,000 tons. This allowed for an increase in the 1977-78 season quota from 5,000 to 9,300 tons.

On July 10, the fishery was reopened with restrictions limiting pure loads to three tons with larger loads allowed to contain up to 50% *by number* Pacific mackerel. Fishing was excellent during the next two months, and on September 18 the season was again closed when the final 9,300-ton quota was met.

On October 1, the 1978-79 season was opened with a 14,000-ton quota. Permit restrictions limited pure loads to eight tons with larger landings limited to 50% by number Pacific mackerel. By December 31, approximately 2,600 tons had been landed.

Preliminary analysis of age composition data during 1978 indicates that the 1976 year class contributed close to 70% of the tonnage landed. The 1977 year class accounted for most of the remaining tonnage with few fish 3 years old and older being represented in samples.

Several indicators suggest that Pacific mackerel had an excellent spawning season during the spring and summer of 1978. During mid- and late summer, San Pedro purse seiners, fishing for bluefin tuna, were "frequently" entering small spots of juvenile Pacific mackerel. These young-of-the-year fish also occurred frequently in near-shore live-bait catches from San Diego to Santa Barbara. In addition, the California Department of Fish and Game's nearshore midwater trawl survey during November of 1978 sampled "above average" numbers of juvenile fish. Prospects seemed good for the continued resurgence of the fishery and the resource. The 1978 catch of 12,364 tons was the highest since 1964 (Table 1).

As 1979 began fishermen were operating under permit restrictions that limited landings to 8-ton "pure

loads" with larger loads allowed to contain up to 50% Pacific mackerel by number. On January 22, when approximately 4,000 tons of the 14,000-ton seasonal quota had been caught, new permits were issued increasing the pure load limit to 25 tons. Landings increased dramatically during the ensuing months, partly as a result of the recruitment of an excellent 1978 year class.

On June 8, as seasonal landings were approaching 13,000 tons, the California Department of Fish and Game increased the quota to 18,000 tons. On June 18, permits were modified in an attempt to reduce the catch rate, and pure loads were again restricted to 8 tons. On July 5, permits were again modified to allow 40-ton weekly limits. Landings increased dramatically in July, and on July 20 the 1978-79 season was closed. Inter-season restrictions were 18% by number tolerance and no pure loads.

On October 1 of 1979, the 1979-80 season began with the establishment of a 25,000-ton quota. Permits were issued without restrictions for the first time since the resource began its recovery in 1975. Fishing was relatively slow during the first few weeks of the new season because of local seiner effort on the tunas. Landings picked up at mid-October, and fishing remained good through December. Seasonal landings were approaching 11,200 tons by the end of December. The 1979 annual landings, estimated at 29,392 tons, represent the third highest catch since 1944 when 41,828 tons were recorded. Landings during 1957 were 31,022 tons.

The success of the 1979 fishery was largely the result of the excellent 1978 spawning season. Preliminary age composition studies indicate that the 1978 year class made up approximately 73% of the fish sampled during the year. Less encouraging is the fact that the 1979 year class of Pacific mackerel had not been detected by any form of sampling (purse seine fishery, research cruises, or live-bait fishery) by the end of the year.

Jack Mackerel

The landings for 1978 are estimated at 33,977 tons, a decrease from the 25-year high of 49,526 tons recorded during 1977 (Table 1).

The reduced catch might be attributed in large part to a dispute between boat owners, fishermen's unions, aerial spotters, and canneries, lasting from late April to early July. This was also the period of time that the Pacific mackerel season was closed, and many fishermen voiced the opinion that the 18% tolerance for Pacific mackerel inhibited their fishing for jack mackerel. On the other hand, a few independent fishermen indicated that both mackerels were generally unavailable for most of this period.

Whatever the case, the eventual settlement in early July resulted in an increase in price for "mackerel" from \$100 to \$130/ton, with an agreement that the price would

be raised to \$150/ton at the end of the year. Fishing turned out to be excellent for most of the remainder of the year, with 75% of the annual landings occurring from July through December.

Length-frequency analysis of 1978 samples suggests that the vast majority of tonnage landed was contributed by the 1976 year class. Fish older than two years are estimated to have made up less than 10% of the catch and one-year olds (1977 year class) were seldom sampled during the period when they normally are recruited into the fishery. It appears that both 1975 and 1977 were below average spawning years for jack mackerel.

During 1979 the annual landings continued on a downward trend. The estimated catch of 17,652 tons was the lowest since 1974. This might partially be explained by the tendency of fishermen to target on Pacific mackerel, which seemed to be more available in nearshore areas. At least partially responsible for the declining trend is the almost total lack of recruitment of both the 1975 and 1977 year classes. Length frequencies indicate that the 1976 year class was predominant in summer landings, whereas the 1978 year class made up the majority of the catch in the fall.

The price to the fishermen for both jack and Pacific mackerel rose from \$130 to \$150/ton during 1979.

Market Squid

California's squid fishery continues to be, in actuality, two fisheries—one centered around Monterey and the other around San Pedro.

Monterey's fishery is typically a summer fishery with good landings often occurring well into fall. The squid are caught almost exclusively by lampara net boats well within two miles of port on the "spawning grounds." During 1978, after four years of poor catches, squid appeared off Monterey as early as April, and sizeable landings continued well into November. The annual landings of 10,406 tons were caught in five months: June, July, September, October, and November. The price to the fishermen was negotiated with processors and remained at \$230/ton for the length of the season. Southern California's fishery is centered at San Pedro with frequent landings at Port Hueneme. It is typically a fall-winter fishery, the season usually running from early November through February, although sizeable landings during the summer have occurred in a few years. Squid in southern California are caught by purse seines and scoop boats, which attract the fish by using powerful lights. Traditionally, the large majority of catches occur within a few miles off the seaward side of Santa Catalina Island. During 1978, 90% of the annual landings of 8,407 tons were caught in four months: January, February, November, and December.

Prices in southern California are regulated by market

conditions rather than by negotiation. They vary during the season and between processors, with market deliveries typically obtaining a higher price than cannery deliveries. During 1978, prices ranged from \$60/ton in February to \$140/ton in October. Markets received close to 80% of the tonnage landed.

The recovery of the Monterey fishery in 1978 together with good landings in southern California resulted in the highest annual statewide catch since 1946, when 19,000 tons were landed.

During 1979, the continued resurgence of the Monterey fishery resulted in the third straight year of increased statewide landings (Table 1), even though the southern California fishery had declined moderately the last two years.

Fishing at Monterey began in early May, and landings continued into November, although catch rates dropped off considerably after September. Peak landings occurred in June when 3,872 tons were caught. Seventy-seven percent of the annual landings of 11,598 tons were delivered from May through September. The negotiated price to the fishermen was \$270/ton.

In southern California, 98% of the annual harvest of 7,356 tons was landed in January, February, November, and December. Scoop boats accounted for 81% of the catch. The price during the year continued to be regulated by market conditions and ranged between \$40 and \$160/ton.

Pacific Herring

During 1978, the California herring roe fishery established an annual record high for the second straight year of approximately 5,774 tons. The 1977 landings, which had previously been reported at 5,826 tons, were in actuality 4,821 tons. The previous high was recorded in 1952 when 4,748 tons were landed.

The fishery continued to be regulated by seasonal quotas by area and gear, with the season generally running from early December when spawning activity begins, to March 31, unless a quota is reached at an earlier date. Quotas during the 1977-78 season were set for five areas: San Francisco Bay, 5,025 tons; Tomales Bay, 600 tons; Bodega Bay, 575 tons; Humboldt Bay, 50 tons; and Crescent City Harbor, 30 tons.

The San Francisco Bay quotas were allocated by gear as follows: gill net, 226 permit vessels, 2,000 tons; purse seine, 30 permit vessels, 1,500 tons; and lampara net, 29 permit vessels, 1,500 tons. An additional 25 tons were allocated for fresh fish market use. In Tomales Bay gear was limited to gill nets (33 permit vessels) and beach seines (5 permits), but the quota was not allocated between gears. For the other three areas, fishing was restricted to gill net vessels only, with a total of one, four, and thirty permits issued for Crescent City, Humboldt Bay, and Bodega Bay, respectively.

Most quotas in San Francisco Bay and Tomales Bay were met by mid-January, with the lampara vessel quota being reached on February 15. Of the remaining 655 tons allocated to the other areas, only 95 tons were landed by the March 31 closure.

Age composition studies indicate that 6- through 9-year-old fish accounted for approximately 90% of fish sampled from the San Francisco gill net fishery. The round haul fishermen typically exploit 2- to 6-year-old fish.

The 1979 landings are estimated at 4,651 tons, a decline for the first time in four years, attributable to San Francisco Bay lampara and Tomales Bay-Bodega Bay gill net fishermen, who were unable to catch their quotas. The fishery continued to be managed by the California Fish and Game Commission, which establishes seasons, quotas, and gear restrictions.

Quotas during the 1978-79 season were: San Francisco Bay, 5,020 tons; Tomales Bay-Bodega Bay, 1,210 tons; Humboldt Bay, 50 tons; and Crescent City Harbor, 30 tons. The gear-allocated quotas for San Francisco Bay were 2,000 tons for 220 gill net permit vessels and 1,500 tons each for 27 purse seine and 31 lampara net permit vessels. An additional 20 tons were allocated for 10 permittees who deliver to fresh fish markets. The Tomales Bay-Bodega Bay fishery was combined for management purposes during 1979, and permittees consisted of 68 gill netters and one beach seine. Humboldt Bay and Crescent City Harbor permittees consisted of four and three gill netters, respectively. Because of congestion, San Francisco Bay and Tomales Bay-Bodega Bay gill net permittees were divided into two platoons, with each platoon fishing alternate weeks.

During the past six seasons, the California Department of Fish and Game has conducted population biomass surveys in San Francisco and Tomales Bays. During 1979, the survey was limited to San Francisco Bay where the total spawning population was estimated at 39,182 tons.

The prices paid to fishermen are based upon a negotiated sliding scale, depending on the percentage of roe recovery. At the end of 1979, a base price of \$2,000/ton for 10% roe recovery was agreed upon for the upcoming 1979-80 season. For each percentage point difference from 10% recovery, \$200/ton was to be added or subtracted from the price. Generally, roe recovery averages about 18-19% during a season, a yield of \$3,600-\$3,800/ton for the 1979-80 season. Processors sample continuously during the offloading procedure to determine the price. Gill netters have consistently received a better price, because they catch a higher percentage of females.

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